FINAL Report

Grant/Contract Title: ALIGNER/BONDER FOR FABRICATION OF NANOSCALE SPECTRAL AND POLARIMETRIC SENSORS

By

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Grant/Contract Number: FA9550-07-1-0478

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AFRL-SR-AR-TR-08-0536

REPORT DOCUMENTATION PAGE

1. AGENCY USE ONLY (Leave Blank)	2. REPORT DATE	3. REPORT TYPE AND DATES COVERED
	11/26/08	FINAL PROGRESS REPORT (06/01/07-8/31/08)

4. TITLE AND SUBTITLE	5. FUNDING NUMBERS
ALIGNER/BONDER FOR FABRICATION OF NANOSCALE SPECTRAL AND POLARIMETRIC SENSORS	FA9550-07-1-0478
6. AUTHOR(S) Prof. Sanjay Krishna (PI)	
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) Center for High Technology Materials, University of New Mexico, 1313 Goddard SE, Albuquerque NM 87106	8. PERFORMING ORGANIZATION REPORT NUMBER Number 1 1
9. SPONSORING / MONITORING AGENCY NAME(S) AND ADDRESS(ES)	10. SPONSORING / MONITORING AGENCY REPORT NUMBER Dr. Donald Silversmith, AFOSR Program Manager 703 588 1780

11. SUPPLEMENTARY NOTES

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12 a. DISTRIBUTION / AVAILABILITY STATEMENT	12 b. DISTRIBUTION CODE
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13. ABSTRACT (Maximum 200 words)

The Center for High Technology Materials (CHTM) at the University of New Mexico had requested funds to purchase a Mask Aligner/Bond Aligner (for example, Suss-microtech MA-6/BA-6) for development of next generation sensors. The funds from this grant were used to supplement some other funds received from AFOSR and AFRL to purchase a refurbished FC-150 with a solder reflow arm. Although the PI, Prof. Krishna, worked hard to obtain as much functionality in the system, some of the options and accessories had to be traded off depending on the budget allocated. The system was installed in the PI's laboratory in May 2008 and has been functional. The first batch of successful focal plane arrays was bonded in November 2008. Since the equipment only has a solder reflow arm, the applied force is limited to only 4Newtons. This may be sufficient for some bonding experiments, but will need further training and modification to obtain a high yield focal plane array.

14. SUBJECT TERMS	15. NUMBER OF PAGES
	16. PRICE CODE

17. SECURITY CLASSIFICATION OR REPORT	18. SECURITY CLASSIFICATION ON THIS PAGE	19. SECURITY CLASSIFICATION OF ABSTRACT	20. LIMITATION OF ABSTRACT
UNCLASSIFIED	UNCLASSIFIED	UNCLASSIFIED	UL

NSN 7540-01-280-5500

Standard Form 298 (Rev.2-89)
Prescribed by ANSI Std. 239-18
298-102

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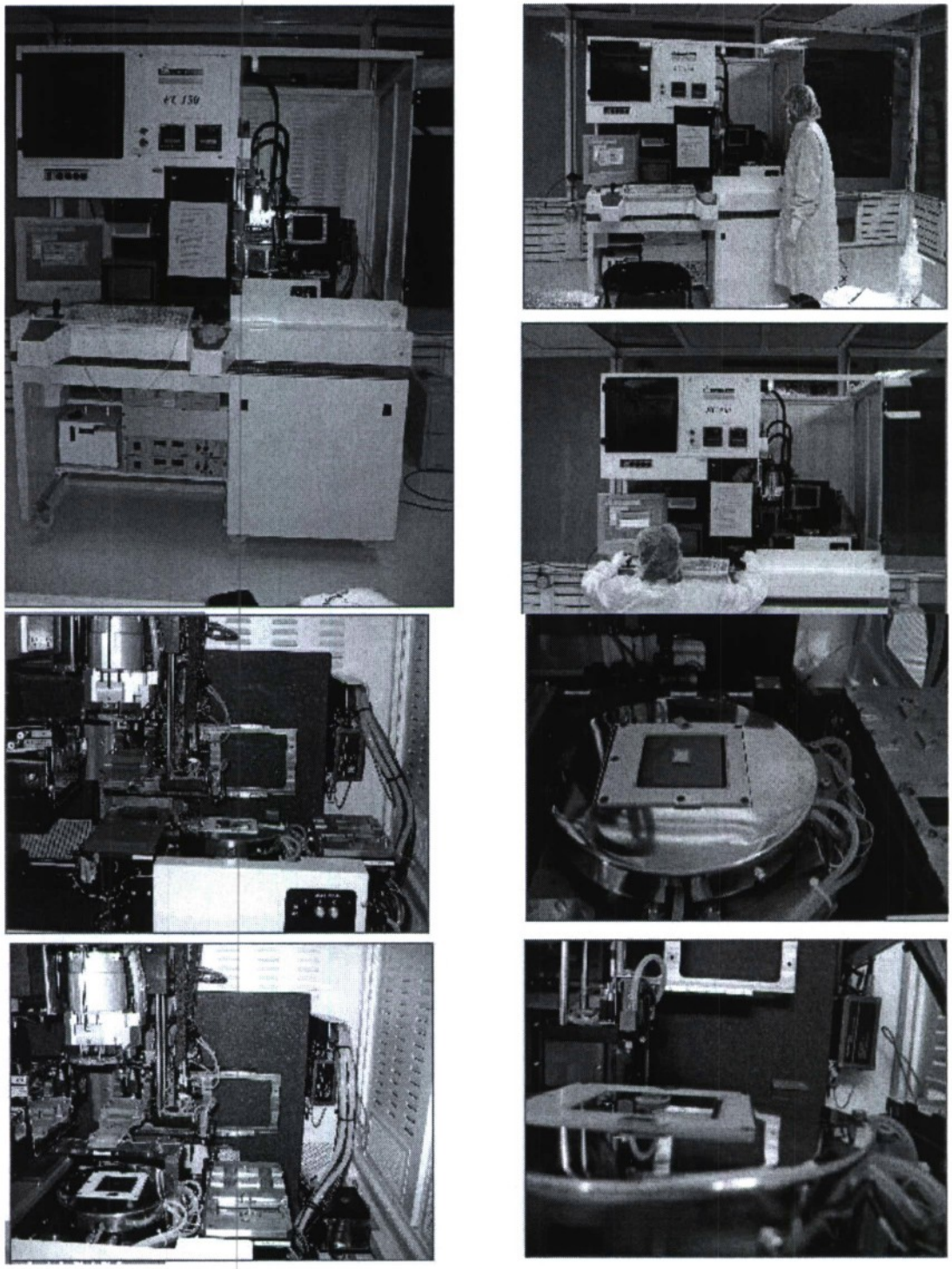
Accomplishments

The Center for High Technology Materials (CHTM) at the University of New Mexico had requested funds to purchase a Mask Aligner/Bond Aligner (for example, Suss-microtech MA-6/BA-6) for development of next generation sensors. The funds from this grant were used to supplement some other funds received from AFOSR and AFRL to purchase a refurbished FC-150 with a solder reflow arm. Although the PI, Prof. Krishna, worked hard to obtain as much functionality in the system, some of the options and accessories had to be traded off depending on the budget allocated. The system was installed in the PI's laboratory in May 2008 and has been functional. The first batch of successful focal plane arrays was bonded in November 2008. Since the equipment only has a solder reflow arm, the applied force is limited to only 4Newtons. This may be sufficient for some bonding experiments, but will need further training and modification to obtain a high yield focal plane array.

The proposed system has various capabilities including (i) Top/ bottom side / infrared alignment, (ii) High-quality, diffraction reduction exposure optics for high resolution (+/- 0.5 mm) (iii) Room temperature to 450C direct (fusion) bonding with post bond alignment accuracies of 0.5 μm (iv) High accuracy fixture and fixtureless, (v) Ability to handle wafers from a few mm to 150 mm. This equipment will serve as a vital resource for a variety of projects at CHTM including three projects currently being undertaken by the PI. This will also serve as a community tool not only for researchers at CHTM but also for researchers all over the nation as CHTM is a part of the National Nanoscience Infrastructure Network (NNIN). Since this will be a shared resource, CHTM/UNM has supported the cost associated with installation and allocation of clean room space for the equipment for no additional cost to the program. Pictures of the system (Suss-Microtech MA-6/BA-6) installed in the PI's laboratory are shown below.



Images of the installed FC-150 Solder Reflow Arm (SRA) FC-150 Hybridizer in the PI's laboratory at the Center for High Technology Materials at the University of New Mexico.

Research and Research-Related Education

The purchase of the proposed system will greatly compliment the efforts being pursued at the Air Force Research Laboratory (AFRL). The PI, Prof. Krishna, works very closely with researchers at AFRL/VSSS (Dr. Dave Cardimona's group) and the proposed system will further bolster the collaborative efforts. One student, Ms. Diana Maestas, graduated with an M.S. from the PI's group and is presently working with AFRL/VSSS. Another student, Ms. Casey Rhodes, is presently working at AFRL/VSSS and is undertaking her M.S. under the PI's supervision.